Stats 318 **Spring 2020**

Homework 2

Due Friday, May 1st

Your homework should be submitted via gradescope by **Friday, May 1st** at the latest. Thanks!

1. Exercise 5.4, Chapter 5 of Levin, Peres and Wilmer. (This is the problem of the lazy walker on the torus.)

2. Exercise 6.2, Chapter 6 of Levin, Peres and Wilmer. (This is the problem on the top-to-random shuffle.)

3. *Decisions, decisions...* An opera singer is due to perform a long series of concerts. Having a fine artistic temperament, she is liable to pull out each night with probability 1/2. Once this has happened, she will not sing again until the promoter convinces her of his high regard. This he does by sending flowers every day until she returns. Flowers costing x times 10,000 USD, $0 \leq x \leq 1$, bring about a reconciliation with probability $\sqrt{x}$. The promoter stands to make about 7,500 USD from each successful concert. How much should he spend on flowers?

4. *First time before we see a pattern.* Suppose we flip a fair coin repeatedly until we have flipped a given pattern. In class, we briefly discussed the expected number of flips needed.

   (a) What is the expected number of flips until we see HTH? [*Hint:* It might be useful to consider a Markov chain whose states are the outcomes of the last three flips.]

   (b) Same question for the pattern HTT.

   (c) Are the answers to (a) and (b) different? If yes, how would you explain this to a non-mathy friend?